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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. |
|---|---|---|---|
| 09/181,809 | 10/29/98 | ISHII | T 101327 |

WM51/1027

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| EXAMINER | |
|---|---|
| CHU,K | |
| **ART UNIT** | **PAPER NUMBER** |
| 2651 | 5 |

**DATE MAILED:** 10/27/00

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/181,809 | ISHII ET AL. | |
| | Examiner | Art Unit | |
| | Kim-Kwok CHU | 2651 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).

**Status**

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-55* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-55* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. § 119**

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

a)☒ All b)☐ Some * c)☐ None of the CERTIFIED copies of the priority documents have been:

1.☒ received.

2.☐ received in Application No. (Series Code / Serial Number) _____ .

3.☐ received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. & 119(e).

**Attachment(s)**

15) ☒ Notice of References Cited (PTO-892)
16) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *2 and 4* .
18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other:

## *Specification*

1. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: PHOTOISOMERIZATION OF A RECORDING LAYER WITH A LIQUID CRYSTAL POLYMER.

## *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> *The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.*

3. Claim 55 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

(a) in claim 55, line 5, the term "recording light to form the optical element" is not clear. Applicant should clarify how the optical element is formed by a recording light;

*Claim Rejections - 35 USC § 102*

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless --
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States.

5. Claims 1-4, 7, 10-14, 17, and 20-55 are rejected under 35 U.S.C. § 102(B) as being anticipated by Chen et l. (U.S. Patent 5,488,597)

Chen teaches an optical recording medium having all of the steps recited in claims 1-4, 7, 10-14, 17, and 20-55. For example, Chen teaches the following:

(a) a light source for radiating a recording/reproducing light along a diameter direction of an optical recording medium (Fig. 1; column 2, lines 13-34);

(b) a light focusing system (column 2, lines 31-33);

(c) a reproducing light system that irradiates said optical recording medium with reproducing light (Fig. 3; column 3, lines 21-37);

(d) at least one optical layer 12 (Fig. 1;);

(e) said optical layer including an optical material that changes a state of photo-induced birefringence in response to

recording light (Fig. 1; column 3, lines 4-8);

(f) a portion of the recording layer 12 that changes a state of photo-induced birefringence acting optically as a half-wave plate (Fig. 1; inherent feature of said recording layer for a certain thickness);

(g) as in claims 2 and 12, said recording layer has a refractive index expresses in variables of wavelength and thickness as $\Delta n * d = (m + 1/2) * \lambda$ (inherent feature where the change of refractive index of liquid crystal is depends on the layer's thickness and the irradiating light's wavelength);

(h) as in claim 3, said photo-induced birefringence is caused by a refractive index change (Fig. 1; inherent feature where the orientation of the liquid crystal is changed);

(i) as in claims 4 and 14, said recording layer 12 comprises a liquid crystal polymer which is photoisomerized (Fig. 1; column 3, line 7);

(j) as in claim 7 and 17, said recording layer 12 comprises a polymer in which photoisomerized molecules are dispersed (Fig. 1; said recording layer is made of photoisomerized polymer);

(k) as in claims 10, 20, 24, 27, 34, 36, 38, 48 and 51, said optical layer has a disk shape recording medium (column 2; lines 31-33);

(l) as in claim 11, an optical reflection layer 14 (Fig.

2; column 2, line 60);

(m) as in claim 21, said optical recording layer that includes a material in which an azimuth of birefringence that is included by recording light changes in response to a rotation of a polarization angle of said recording layer (Fig. 1; column 3, lines 4-8);

(n) as in claims 22 and 26, step of using said recording layer 12 to control a polarization angle of recording light (Fig. 1: said birefringence controls a polarization angle of recording light);

(o) as in claims 22 and 26, step of using said liquid crystal polymer as a half wave plate (Fig. 1; inherent feature of said polymer for a certain thickness);

(p) as in claims 23, 27 and 32, directing said recording light to a polarization rotary device 18 (Fig. 1);

(q) as in claims 25 and 29, said optical element is formed in a position at least partially coextensive an existing optical element in said optical recording medium 12 (Fig. 1; inherent feature where said optical element is a liquid crystal formed said recording medium);

(r) as in claims 30 and 31, a spatial optical modulator 18 that controls a polarization angle of said recording light (Fig. 1);

(s) as in claims 33, 42, 45, 47 and 50, said optical

recording apparatus having a medium driving and head moving mechanism (Fig. 1; column 2, lines 31-33);

(t) as in claims 35, 37, 39 and 40, said recording medium stores multilevel (layers 12) of information (Fig. 1);

(u) as in claims 41 and 44, said reproducing light has a light intensity smaller than that of said recording light (inherent feature where data reading light intensity is always smaller than data writing intensity);

(v) as in claims 46, 49, 52, 53 and 54, an analyzing unit 52 that detects a polarization angle of recording light (Fig. 1; detector 52 detects the recording light); and

(w) as in claim 55, said optical element formed on said recording layer adjust a polarization angle of a reproducing light by an amount greater than a difference between a polarization angle of recording light (inherent feature where the optical element is a wave plate).

## *Claim Rejections - 35 USC § 103*

6. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> *(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.*

7. Claims 5, 6, 8, 9, 15, 16, 18 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Patent 5,488,597) in view of Tachibana et al. (U.S. Patent 5,529,864)

Chen teaches an optical recording medium having a recording layer made of liquid crystal polymer very similar to that of the instant invention. However, Chen does not teach the following:

(a) as in claims 5, 8, 15, 18, said polymer contains an azobenzene skeleton; and

(b) as in claims 6, 9, 16, 19, said polymer comprises at least one kind of monomer-polymer.

Tachibana teaches an optical recording medium having a recording layer made of azobenzene and monomer (Fig. 1; column 3, lines 26 and 49).

Liquid crystal polymer comprises of azobenzene and monomer

are not novel. Although Chen does not disclose how his liquid crystal recording layer is formed, many prior art such as Tachibana teaches that his recording layer uses monomer and azobenzene.

Therefore, when there is a motivation of making a liquid crystal type recording layer, it would have been obvious to one of ordinary skill in the art to use azobenzene and monomer because those are typical materials prior art used to manufacture a recording layer.

In other words, it would have been an obvious design choice to use azobenzene and monomer to make a liquid crystal type recording layer as the applicant has not disclosed that any specific material overcomes any deficiency in the prior art or as for any stated purpose. The examiner takes Official Notice of this teaching as being known to these of ordinary skill in the art.

*Conclusion*

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Morikawa et al. (5,644,416)) is pertinent because Morikawa teaches a light modulating device.

Akashi et al. (5,589,237) is pertinent because Akashi teaches a liquid crystal device made of monomer-polymer.

Tsujioka et al. (5,316,900) is pertinent because Tsujioka teaches an optical medium having a birefringent layer.

Best et al. (5,255,262) is pertinent because Best teaches a multiple data surface optical data storage system.

Leube et al. (5,251,197) is pertinent because Leube teaches a polarization dependent writing and erasing process for an organic optical media.

Gibbons et al. (5,032,009) is pertinent because Gibbons teaches an alignment in a liquid crystal media.
Kawanishi et al. (5,296,321) is pertinent because Kawanishi teaches a photo-recording element.

Waters et al. (4,925,708) is pertinent because Waters teaches a liquid crystal devices which acts like a half-wave plate.

9. Any response to this action should be mailed to:
Commissioner of Patents and Trademarks Washington, D.C. 20231
or faxed to:
(703) 305-9051, (for formal communications intended for entry)
Or:
(703) 305-9731, (for informal or draft communications, please label "PROPOSED" or "DRAFT")

Hand-delivered responses should be brought to Crystal Park II, 2021 Crystal Drive, Arlington. VA., Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kim CHU whose telephone number is (703) 305-3032.

W. R. YOUNG
PRIMARY EXAMINER

KC 10/17/2000

Kim-kwok CHU
Examiner AU2651
October 17, 2000

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